

Environment
Ontario

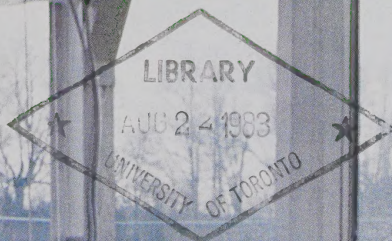
Government
Publications
legacy

Spring/Summer 1983

Vol. 11 No. 4

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Acid Rain

Junction Triangle

Andrew S. Brandt appointed Minister of the Environment

Ontario's new Minister of the Environment is the Honourable Andrew S. Brandt, MPP for Sarnia, whose appointment was announced by Premier William Davis just as Legacy went to press.

Andy Brandt was elected to the Ontario Legislature in March of 1981 and two months later was appointed Parliamentary Assistant to the Minister of Labour.

He served on the Legislature's Standing Committee on General Government, the Standing Committee on Regulations and Statutory Instruments, the Standing Committee on the Administration of Justice, the Select Committee on Pensions, and the Regulations Committee of Cabinet.

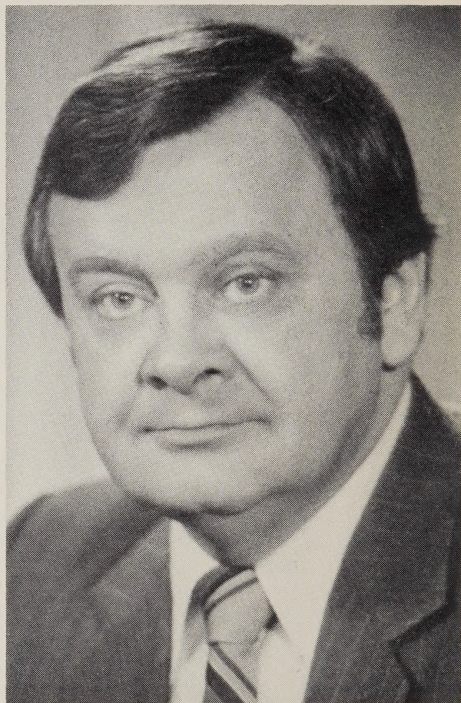
From 1975 to 1981 Mr. Brandt served three terms as mayor of the City of Sarnia. He was elected to Sarnia City Council as an alderman in 1971 and re-elected in 1973.

The new minister was born, raised and educated in London, Ontario, and moved to Sarnia in 1961. He has been involved in various business enterprises, including the manufacturing, wholesaling and retailing of musical instruments.

He has been a lecturer at Lambton College of Applied Arts and Technology in Sarnia and is a past president of the Sarnia Kiwanis Club and a past chairman of the Sarnia United Appeal.

He is an honorary member of "C" Squadron, First Hussars, an armored regiment of the Canadian Armed Forces, and of the Royal Canadian Air Force Association and the Naval Association.

He is also a life member of the American Federation of Musicians, a member of the Sarnia and District



Andrew S. Brandt

Chamber of Commerce, and a former vice-president and member of the board of directors of the Association of Municipalities of Ontario.

Mr. Brandt and his wife, Patricia, are the parents of two daughters, Sherri and Lori.



Ontario

Ministry
of the
Environment

Hon. Keith C. Norton, Q.C.,
Minister

Gérard J. M. Raymond
Deputy Minister

Published quarterly by the
Ministry of the Environment,
Communications Branch, 135
St. Clair Avenue West, Toronto,
Ontario, M4V 1P5, for those in-
terested in the many facets of
environment enhancement.
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(photo: Tessa Buchan)

Al Hill of the Brampton phyto-
toxicology laboratory tends alfalfa
plants used for studies on the effect
of simulated acid rain on agricul-
tural crops.

Environment Ontario **legacy**

Spring/Summer 1983

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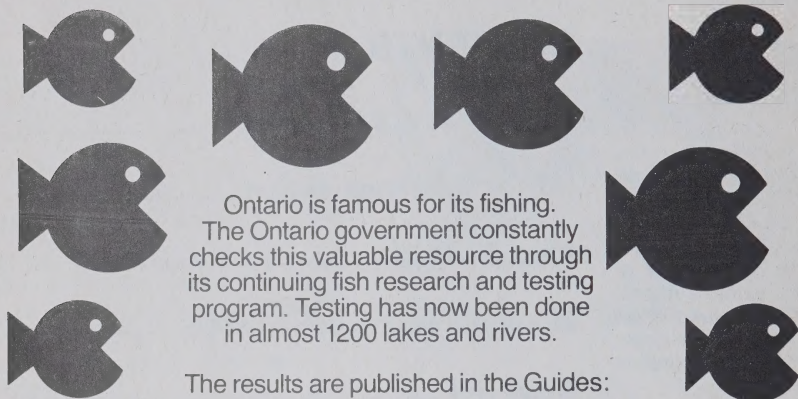
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ONTARIO'S FISH TESTING PROGRAM



Ontario is famous for its fishing.
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checks this valuable resource through
its continuing fish research and testing
program. Testing has now been done
in almost 1200 lakes and rivers.

The results are published in the Guides:

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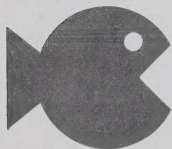


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Ministry of the
Environment
Hon. Keith C. Norton, Q.C.,
Minister



Ontario

Ministry of
Natural Resources
Hon. Alan W. Pope,
Minister

Ontario, New York agree to co-operate on acid rain

An Ontario-New York State Memorandum of Understanding to exchange scientific information and to participate in joint research projects on acid rain was signed in Toronto by Environment Ontario Minister Keith Norton, Ontario Intergovernmental Affairs Minister Tom Wells, and New York State Commissioner of Environmental Conservation Henry G. Williams.

"Ontario has gained a very powerful and influential ally in the struggle against acid rain with the signing of this Memorandum," said Mr. Norton. "The memorandum will eliminate duplication of cost and effort for both jurisdictions and increase our mutual effectiveness."

The memorandum calls for:

- Standardization of methods and procedures for sampling and laboratory analysis.
- Co-operation in the field of atmospheric modelling and tracer studies designed to identify sources and transport and to exchange the results of these studies.
- Collaboration in setting up compatible and complementary scientific research programs for investigating the environmental and socio-economic consequences of acid precipitation.
- Free exchange of scientific information between government agencies, universities and other interested scientific groups, through

the publication of research reports and the organization of symposia. — Preparation of a joint course of action to influence decisions in favor of emission reductions for pollutants that cause acidification of the environment.

"It will also increase the awareness of acid rain as a serious pollution problem throughout the U.S. and thereby lend more weight to Ontario's argument for increased control of emissions by U.S. sources," Mr. Norton stated.

Norton demands action on Love Canal seepage

"Neither I nor my officials have ever been completely satisfied with the progress the Americans are making" to keep contamination originating in the Love Canal from seeping into the Niagara River, Environment Minister Keith Norton said in a statement to the Ontario Legislature.

"While the drinking water in communities on the Canadian side of the river is perfectly safe, we are conscious of the potential threat that exists if abandoned dump sites such as the Love Canal are not properly controlled."

Last summer, the ministry engaged Geologic Testing Consultants of Ottawa to review and interpret independently the hydrogeologic conditions of Love Canal. On the basis of this report and its urgent recommenda-

tions, Mr. Norton presented the following requests for action to the U.S. authorities:

- The provision of funds for the clean-up — not just further investigation — of sewers, creeks and outfalls that have been contaminated from the Love Canal area.
- The dredging of contaminated sediment from the heavily contaminated Cayuga Creek which drains into the Niagara River.
- A monitoring system to establish the long-term effectiveness of remedial work already planned by the Environmental Protection Agency.
- Additional monitoring programs designed and put in place to show whether there is a possibility of ground water at the site moving downward into the bedrock below.

"If all the actions contained in these recommendations are implemented together with the remedial measures already in hand by the EPA, I believe that the problems caused by the Love Canal will be in large measure contained," Mr. Norton said.

"If the other waste disposal sites adjacent to the Niagara River are controlled to the same extent as the Love Canal, we will make a tremendous stride toward protecting and improving the river's quality."

Public to help in PCB destruction

Environment Minister Keith Norton has invited the public to become involved in solving the problem of the destruction of PCBs.

He has invited municipal officials, public interest groups, trade associations and experts to comment on guidelines drawn up by the ministry for the destruction of PCBs in mobile facilities.

"Mobile destruction technologies offer the opportunity to deal with the PCB problem on a community-by-community basis," Mr. Norton said.

These technologies, he added, "may be more acceptable to citizens who would otherwise oppose establishment of large-scale permanent destruction facilities within their community."

Pitch-In 1983

1,800 groups spring-clean Ontario

The week of May 8th to 15th, enthusiastic Ontarians wrestled with rubber tires, waded into rivers and scouted the woods for litter as part of the third annual Pitch-In campaign.

This year more than 1,800 groups participated, almost 50% more than 1982.

The campaign is coordinated by the Ontario Federation of Anglers and Hunters and is supported and endorsed by the Ontario Ministry of the Environment. Free garbage bags were supplied by Shell Canada.

Cecil Wilson of the Schomberg and District Rod and Gun Club feels that the aim of the project is, "not to clean an area spotless, or to get publicity for a club. The point is to make people aware that somebody is suffering for their carelessness."



(photo: Micki Little)

A student from O'Neill Collegiate in Oshawa had her enthusiasm wetted during her school's clean up of the Oshawa Creek. More than fifty youths from urban geography and environmental science classes participated in the first year for Pitch-In at Oshawa.



A broken leg didn't stop Tom Kaddits, member of the Rideau Trail Association, from organizing and participating in Go To Blazes Day, an all-out effort to clear up the trail, which stretches from Kingston to Ottawa.

(photo: Tracy Peverett)



The members of the Schomberg Rod and Gun Club spent the fishermen.



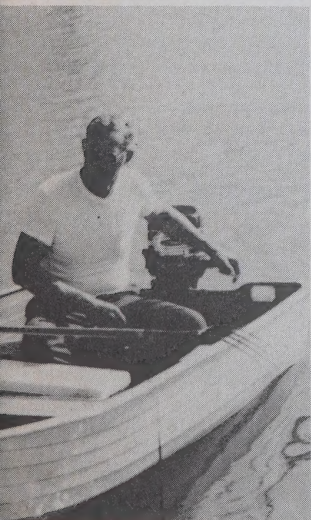
(photo: Susan Watson)

Laurie Bailey and Kristina Seed of the Schomberg Brownies have to work hard to get a discarded tire they found behind the fire hall into a garbage bag.



Over 200 Brownies, Guides, Beavercubs and Scouts made a clean sweep of the town of Hanover during Pitch-In Day, Saturday, May 14. These three youngsters had almost more garbage than they could handle. Over 2,000 garbage bags were filled at the end of the day.

(photo: Micki Little)



ay cleaning up litter left by careless

(photo: Susan Watson)



"Au boulot" means pitch-in en français, and that's exactly what these grade 2 students from Ecole de la Cathedrale did for their City of Kingston.

(photo: Tracy Peverett)

Norton tables Blueprint for Waste Management

Environment Minister Keith Norton has issued a Blueprint for Waste Management in Ontario and at the same time a challenge to government, municipalities, business and industry, special interest groups and individuals.

Better means have to be found to efficiently and safely dispose of eight millions tons of solid waste and 60 million gallons of liquid industrial waste generated in Ontario each year, Mr. Norton told the 30th annual Ontario Industrial Waste Conference in Toronto sponsored by the Ministry. The conference attracted some 600 delegates.

consultation with ministry team

The 75-page Blueprint and its 11 appendices present a comprehensive series of Ministry proposals and options, including proposed controls and regulations which cover the full spectrum of waste management from generation through recycling to post-disposal environmental security. In a general invitation for full public participation, the Minister called for comments and ideas during the draft stages of the Blueprint process which began last November.

Mr. Norton announced a summer-long program of further consultation in which the Ministry's Blueprint team will meet and talk with a full range of interests across Ontario

cost effective source separation

about the waste management issues and proposals in the Blueprint. Following this, senior Ministry officials will conduct public meetings to receive oral and written presentations

and submissions before the final Blueprint is completed for implementation in phases starting early in 1984.

Mr. Norton said he wanted to see more recycling of materials now consigned to garbage, "from the neighborhood Boy Scout paper drive to the industrial exchange of thousands of gallons of chemicals."

The Environment Ministry, he pointed out, provides seed money to start and stabilize regional source separation programs.

"Within the Ontario Government, we have implemented a cost-effective source separation program for fine paper and made a good start on encouraging similar programs in the private sector."

Mr. Norton asked for a response to his Blueprint from all sectors of Ontario society "on how my Ministry and I can most effectively contribute to substantial supplies of recyclable material, an efficient system for their collection and delivery, and an assured market for their use."

fees for waste treatment

He promised to investigate the possibility of a Good Packaging Seal of Approval to be developed and jointly endorsed by the Environment Ministry and industry.

Another innovation he suggested for discussion was a disposal fee to be levied at all treatment and disposal facilities on all wastes received.

"The revenue from this could be applied to offset some of the capital costs of processing facilities and to provide funding for source separation, education and demonstration projects related to the four Rs."

Mr. Norton praised municipalities which practice long-term waste management planning, but also said this was an area where "the temptation is

greatest ... to take short cuts in the interests of expediency."

Municipalities must strive for a better quality in waste management planning, incorporating more constructive public consultation to reduce the atmosphere of conflict which prevails in so many waste site decisions to date.

The Minister said he was proposing a perpetual care program to ensure that any problems arising from landfill sites can be safely and efficiently resolved.

perpetual care program proposed

"In this perpetual care program, we are developing a proposal of guaranteed protection which provides financial assurance to cover every stage of life of a site and continuing insurance after its closure."

The Minister said the challenge of the Blueprint, is to work together — first to plan, then to implement, and finally to maintain consistent performance.

"Our reward," Mr. Norton said, "is the maintenance of a clean, safe and healthful Province."

Quebec has 13 dangerous sites

A study of 48 known waste disposal sites in Quebec revealed that at least 13 may be dangerous to human health and to the environment, George Mazetta, director of the Quebec Environmental Protection Service, says. A study will be started to assess the threat. Additional sites will be examined closer at a later date.

The \$45,000, five-month study was part of the first phase of an Environment Canada project designed to assess the environmental effects of waste sites across the country.

Ancaster High has "Royal recycling machine"

by Micki Little

Students at Ancaster High and Vocational School are thinking twice about crumpling up old exams and assignments and tossing them into garbage cans. Instead, most of the paper is going into special collection boxes placed just outside their classrooms.

Throughout the school some 60 of these boxes are distributed and identified with a bright orange sign reading "Royal Re-Cycling Machine — Save Paper!" These boxes play an important part in the paper recycling program that thrives inside the doors of Ancaster High.

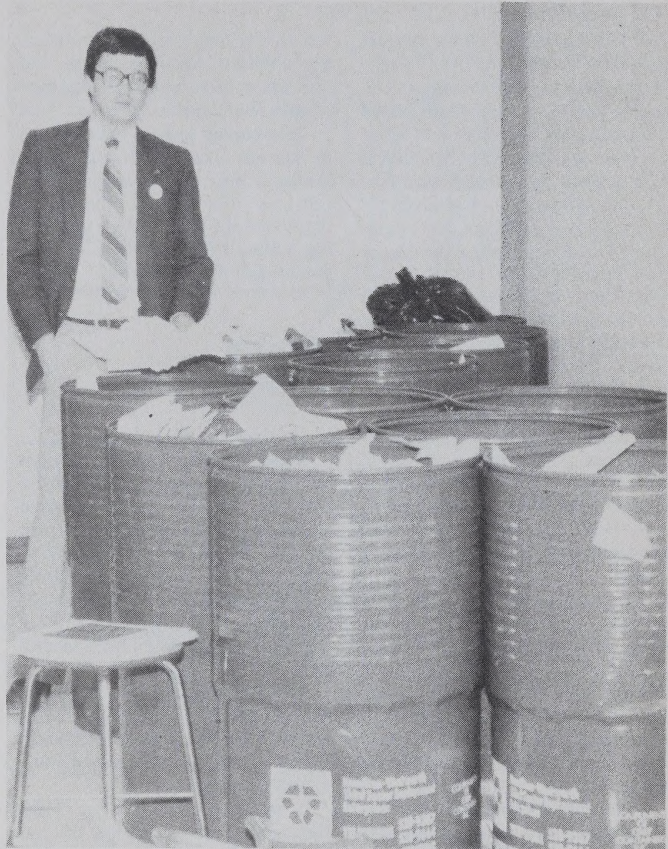
In May, 1982, Alan Stacey, history teacher, organized a pilot project to find out if a paper recycling project had potential for the school. By June, with negotiations for paper pickup by The Third Sector paper recycling operation in Hamilton going smoothly, Stacey had his answer.

A full-scale school paper collection and recycling program began in October, 1982. By February, 15 large bins were overflowing with paper, part of the 12 tons ordered by the school each year. Everyone expects to have another 15 bins full by June.

Stacey feels the project has been fairly easy to organize. He only uses a handful of students to sort through the bins for unacceptable paper such as lunch bags and magazines. The real work turns out to be getting students and adults into the habit of putting the paper into the collection boxes, Stacey explained.

So far, no other school has tried to coordinate its own paper recycling program. "Part of the difficulty is that small schools have less paper and it's not worthwhile to have it picked up by a recycling operation," Stacey says. "It would be up to the (school) boards to take the paper to the recycling business."

Stacey knows, however, that if the recycling project at Ancaster High is



Alan Stacey, initiator of the paper recycling program at Ancaster High, inspects some of the bins his students have filled.

(photo: Micki Little)

to continue, "we'll need some incentive to keep the enthusiasm going." Currently, the school doesn't receive any money for the paper. But, if enough paper is sent to The Third Sector, Stacey will be looking for something in return. If it is money, it will be channelled back into the student council.

Fortunately, collecting paper and supporting causes aren't new projects

to students at Ancaster High. From 1974 to 1976, Stacey led young people through the streets of Ancaster collecting old telephone books for recycling. In the end, over 10 tons of books were handed over.

"It's important to show the students they can do something, make a positive contribution, be effective," says Stacey. "The key is the involvement and enthusiasm of the kids."

York-Durham project

On budget and two years ahead

Environment Ontario's largest project, the \$300 million York-Durham sewage treatment system, is nearing completion two years ahead of schedule and on budget — if inflation since the start of construction in 1975 is taken into account.

C.J.K. Wilson, project manager for the ministry, is confident that Woodbridge will be connected to the system in 1983 and Newmarket and Aurora in 1984. This will complete the over 100 km long system that will carry waste eventually from 800,000 people to the Duffin Creek Pollution Control Centre in Pickering.

The project was speeded up in response to the faster-than-expected development of industrial construction north of Steeles Avenue West. At the beginning of 1983, sewage mains have been constructed as far as Bloomington Sideroad, just south of Aurora.

The trunk sewer main that will eventually collect sewage from Woodbridge is in place to Black Creek. Construction of the Black Creek pumping station has been completed. The Humber pumping station is under construction, as well as the forcemain leading to the Black Creek pumping station.

At the Duffin Creek plant which is in operation, two contracts are still under way. One of them involves the installation of a computer system; the other, modifications to the mechanical and to the electrical system of the plant necessary to facilitate computerized operation.

The computer will provide instant data that will allow the streamlining of the plant's operation from a central control panel.

The design of the Duffin Creek plant has undergone other improvements. In the beginning, land disposal of sewage sludge was not considered to be a problem. In the following years, the need to conserve energy

led to the development of more sophisticated sludge handling and disposal systems because sludge may contain heavy metals.

"The energy squeeze has taught us to squeeze more water out of the sludge to make it combustible," Wilson says. This will be achieved by improvements to the sludge dewatering system by the addition of filter presses and other facilities.

to serve 800,000 people

Another modification to the original plan involves the central Duffin collector. It was designed to serve the since-cancelled Pickering airport project. The connection will, however, be partially built in 1983 to serve an area of development north of Finch Avenue and it will also collect leachate from the Brock Road landfill site.

The York-Durham sewage system has been designed for the protection of waters in the Don, Humber and Rouge Rivers. Its effectiveness is becoming evident.

In addition, the inclusion of the Newmarket-Aurora area into the system will reduce the phosphorus loading to the Holland River and to South Lake Simcoe.

The construction of the system has also sparked a vigorous industrial, commercial and residential development in the serviced area north of Toronto.

The completion of the first stage of the system in 1981 allowed the closing of nine sewage treatment plants on the Don and Rouge Rivers and on Duffin Creek.

Two more sewage treatment plants in Newmarket and Aurora will become obsolete in 1984. All closed

plants have been or are in the process of being demolished with the exception of the old plants in Pickering and in West Richmond Hill. These plants are being considered for development as fish hatcheries or fish fattening centres.

In parallel with the sewage collection system, a 4.0 million gallon water supply system serving the York area is also nearing completion. It will supply Lake Ontario water, treated in the Metro Toronto water system, to Markham, Unionville, Thornhill, Richmond Hill, Maple, Woodbridge and East Woodbridge.

In the York-Durham project, Environment Ontario is responsible for all design and construction. Durham operates the Duffin Creek sewage treatment plant. The regional municipalities operate and maintain the collector system in their regions.

four million gallon water supply

For the sewage system, Environment Ontario is providing a 15 per cent subsidy to underwrite capital construction costs and a special housing grant of \$32.5 million is arranged through the Federal Government. A provision for forgiveness in federal government municipal sewage loans subtracts a further 16-2/3 per cent subsidy from the total cost of the project.

The provincial investment will be recovered through a service charge to the regional municipalities for all sewage received and treated. This service rate will be reviewed regularly. The manner in which such charges are passed on to the taxpayer is determined by the regional and local municipal councils.

Improved analysis finds new dioxin sources

Until fairly recently, dioxins were believed to be unwanted contaminants that formed only under certain circumstances during the production of polychlorinated phenols such as some herbicides, said C.J. Macfarlane, director of Environment Ontario's hazardous contaminants and standards branch.

Now the suspicion grows that they may also be generated by the burning of domestic and other wastes, by the operation of automobile engines and by other combustion processes.

"The main reason they remained undetected until recently is that analytical capabilities are only now able to identify chemical compounds in the miniscule amounts in which dioxins and their chemical relatives, furans, appear in the environment," Mr. Macfarlane said.

"With this new capability, Environment Ontario's dioxin analysis unit has become one of the leading facilities of its type in North America."

In February, Ontario Environment Minister Keith Norton announced that traces of compounds of the dioxin family were detected in three of 154 samples of untreated water from the Niagara area.

One each of these samples was of surface water of the upper and lower Niagara River, the third was taken from a channel branching off the Welland Ship Canal in the St. Catharines area.

The levels of the three samples were 0.017, 0.010 and 0.028 parts per trillion respectively. A ratio of 0.010 parts per trillion can be compared to the duration of one second in three billion (or three thousand million) years.

No dioxin was found in treated drinking water at Niagara-on-the-Lake, Niagara Falls or St. Catharines.

In July, 1981, the federal Department of Health and Welfare established an acceptable level in fish of 20 parts per trillion of 2, 3, 7, 8 TCDD, the most toxic compound of the dioxin family. This level was at the time very close to the then existing analytical capability to detect this compound.

At the low levels at which dioxins were found in Niagara water, it is impossible to determine which of the 75 members of the dioxin family of compounds was actually found.

In March, 1983, Environment Ontario analysts reported the detection of somewhat higher dioxin levels in six of 85 samples taken from containment and test wells on the Uniroyal Ltd. property in Elmira. These tests showed dioxin levels ranging from 0.2 to 0.4 parts per trillion.

Again, the presence of the most toxic dioxin, 2, 3, 7, 8 TCDD, could

not be confirmed at these low levels.

No dioxins were found in the municipal or private water supply or in fish caught in the area.

In both cases, in the Niagara area and in Elmira, the dioxins found may have had their origin in the manufacture of chlorinated phenols such as the production of phenol herbicides. The Niagara River dioxin may have leached out of industrial waste dumps in New York State.

The Uniroyal plant in Elmira was involved in the manufacture of pesticides and other industrial chemicals for 30 years and had used areas on its property for the disposal of wastes.

But the dioxins and related polychlorinated dibenzofurans found in stack emissions of the incinerator of the Solid Waste Reduction Unit (SWARU) in Hamilton must be considered a product of the combustion of waste.

First guidelines in North America

Domestic waste contains a sufficient amount of chlorine — in the form of salt and as a component of some plastics — to allow the formation of dioxins and furans if the heat of combustion is too low or emission controls are not working to design expectations, Mr. Macfarlane said.

The levels of dioxins and furans detected in SWARU stack emissions were roughly equal to the newly-established guideline, double the guideline level in a second sample and triple the level in the third sample.

The provincial guideline, the first established in North America, is set at a half-hour average of 450 picograms per cubic metre of air or an annual average of 30 picograms per cubic metre of air. (One picogram is one trillionth of a gram or 1×10^{-12} gr.)

To control the situation, Environment Minister Norton ordered

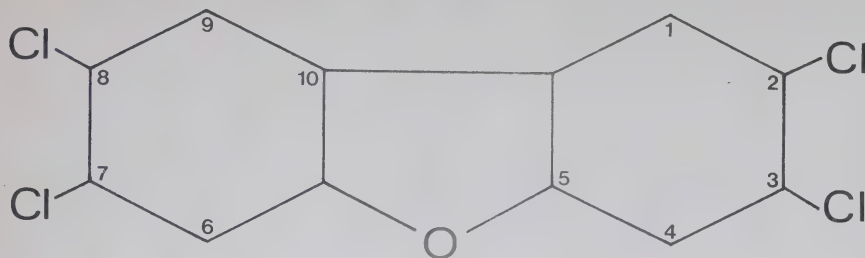
SWARU to immediately cut back the burning of solid waste by 20 per cent. This cutback provides an added margin of safety to the substantial safety factor already built into the guidelines.

At the same time, the minister ordered an expanded air testing program and an immediate study aimed at an improvement of the combustion efficiency of the two SWARU burners.

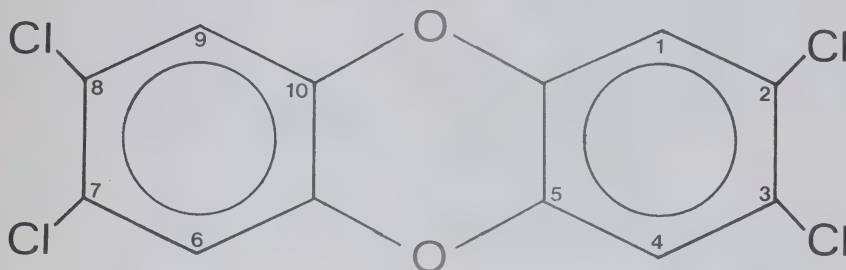
Announcing the order, Mr. Norton said that latest technology can ensure that incineration as it is proposed for steam generation in Toronto and in London can insure efficient combustion and effective destruction of all contaminants.

The term "dioxins" denotes a group of 75 chemicals known to chemists as polychlorinated dibenzo-p-dioxins. These and a closely related class of polychlorinated dibenzofurans may be formed

THE MOST TOXIC DIOXIN AND FURAN:



2,3,7,8-TCDF



2,3,7,8-TCDD

The numbering of chemical compounds can best be understood by this schematic diagram of the most toxic dioxin and furan molecules. The sequence of numbers in the diagram is defined by a formalized naming system set by the International Union of Pure

and Applied Chemistry (IUPAC). The numbering is important because it indicates the position of the chlorine atoms, and the positions indicated above of chlorine (Cl) on the dioxin and furan molecule have a profound effect on the toxicity of the compound.

during the burning of halogenated organic chemicals such as pesticides, or when non-chlorinated organics are burned in the presence of chlorine-containing compounds.

Of the 75 dioxins and 135 furans, the compound known as 2, 3, 7, 8 TCDD is considered the most toxic. Doses as small as 0.6 micrograms per kilogram of body weight kill guinea pigs. Rats and mice are less sensitive. For them the deadly dosage is 22 and 280 micrograms respectively. A microgram is a millionth of a gram.

The sensitivity of humans to the compounds is not known.

The other dioxins and furans are hundreds to millions of times less toxic.

For regulatory controls, however,

the U.S. Environmental Protection Agency assumes the toxicity of all dioxins and furans to be equal to the toxicity of 2, 3, 7, 8-TCDD. One reason for this assumption may be that research has been concentrated on the most toxic compounds and little is known about all the others.

research concentrates on most toxic forms

Studies of the effects of dioxins and furans on humans show that occupational exposures during industrial mishaps and contact with these compounds may have caused cases of

chloracne, a severe form of acne that can last many years and may leave the victim scarred for life.

Numerous cases of this affliction reported in 1968 in Japan were originally attributed to the consumption of rice oil contaminated with PCBs that had leaked into the rice oil from heat transfer equipment.

Recent research suggests that the main cause of the affliction may not have been the PCBs themselves, but their very high contamination by furans.

Another effect observed by an Italian pharmacological research institute was that even single, very low doses of the most toxic dioxins and furans impaired the functioning of the immune system in mice.

Acid rain

Bright spots show on the dark cloud

by Robert Koci and Anson Raymond

"There are indications that the attitude toward acid rain is changing even among the nations that have up to now been considered as principal generators of acid rain — causing sulphur dioxide emissions," Walter

Giles, associate deputy minister responsible for the Intergovernmental Relations and Strategic Projects Division of Environment Ontario, said in an interview with Legacy.

The Scandinavian countries, batt-

ling acid rain since the early 70s, have always claimed that SO₂ emissions in the heavily industrialized areas of Germany and Britain are a major cause of the acidification of their lakes. Now Germany and Britain both



Walter Giles, Environment Ontario's associate deputy minister responsible for the Intergovernmental Relations and Strategic Proposals Division (centre), listens intently to Ron Reid of the acid precipitation research facility near Dorset, describe some effects of acid rain on lakes.

(photo: Hans Eljseck)

recognize the dangerous affects acid rain has and are taking steps to correct the situation.

"Similarly, Ontario's hopes for a change in attitude of its U.S. neighbors and since the autumn of 1981, Environment Ontario has worked hard to increase the awareness of the U.S. administration and of the U.S. people of the acid rain problem," Mr. Giles said.

Nearly 100 U.S. journalists and politicians visited, as guests of the Canadian and Ontario governments, areas affected by acid rain and En-

vironment Ontario's research facilities. The visitors were given ample opportunity to discuss the problem with Canadian experts and with the Canadians affected by it.

Following these visits, the U.S. media dealt with the subject in numerous publications, radio, and TV broadcasts. Reports were printed in such widely-read magazines as National Geographic, Time, and Newsweek, and Environment Ontario officials frequently receive requests for additional information from U.S. journalists.

As a result, Mr. Giles said, the U.S. public is better informed than

47% favor stricter provisions

ever before. It is also starting to realize that its own environment is being affected by acid rain. Evidence of this better understanding is a recent poll held in the U.S. It shows that 47 per cent of the respondents favored stricter provisions in the Clean Air Act, now under revision by the U.S. Government.

nations co-operate on research

One of the results of this co-operation is that the Ministry of the Environment, the Federal Republic of Germany and Environment Canada have joined forces to develop a next-generation computer model to trace the transport and deposition of acidic pollutants and oxidants. This work is to be completed by 1986.

A vital part of the detective work to determine and pinpoint accurately the sources and the path of the long range transport of air pollutants involves the network of acid precipitation and air quality monitoring stations established by the ministry across the province and computer modeling techniques developed to study trans-

"Another example is given by the 190 out of 199 New Hampshire towns which recently asked Washington to work with Canada to cut acid rain — causing emissions in half by 1990."

"Ontario has also taken many opportunities to intervene in the proceedings of the U.S. judiciary and administrative system dealing with SO₂ emissions," Mr. Giles said. "One of these interventions contributed to a recent refusal of the Michigan Air Pollution Control Committee to extend a permit granted to the Monroe power plant, the fifth largest emitter of SO₂ in eastern North America, to continue the use of coal with 2.1 per cent sulphur content."

Michigan regulations demand that coal with 1 per cent sulphur content be used for power generation, unless a special permission is granted, and largely as a result of Ontario's submission no such permission was granted.

"The leading role Ontario has gained in acid rain research and the new understanding of acid rain effects in Europe has also led to a lively exchange of information and closer co-operation between scientists on both sides of the Atlantic," Mr. Giles said.

port and physical and chemical processes.

"Over the past few years, atmospheric chemistry knowledge has improved significantly," explained Lou Shenfeld, supervisor of the air quality and meteorology section of the ministry's Air Resources Branch.

"Atmospheric chemical transformation modelling techniques have also shown improvement and promise. It is now therefore possible to develop a long range transport computer model that simulates the chemical reactions which occur as pollutants travel in the atmosphere over long distances. The new model is being designed to do just that."



The pollutants of interest are sulphur dioxides, nitrogen oxides, ozone and acidic deposition. The model will tell what happens chemically every hour while the pollutants travel in the air over the U.S. and Canada, over distances of thousands of kilometers.

"The models are being designed to simulate individual pollution episodes. An average of several episodes can then provide information on cumulative effects," Mr. Shenfeld said.

models simulate individual episodes

"With the help of this model, we will be much better able to identify sources contributing to acidic deposition and oxidants. This will provide additional information to prove that the acid rain problem can only be solved in co-operation with our neighbors."



Lou Shenfeld, supervisor of the air quality and meteorology section studies a printout of the new computer model.

(photo: Tessa Buchan)

better understanding of neighbors needed

For Dr. Tom Brydges, co-ordinator of the Acidic Precipitation in Ontario Study, the better understanding and the willingness of our neighbors to get involved in a solution of the acid rain problem is vital.

"The prognosis for Ontario lakes is not good," he said. "There is evidence today that the biological systems of our sensitive lakes are being affected more than previously thought and acid deposition at current values cannot be allowed to continue.

"The basic chemistry of our lakes in the sensitive regions of Muskoka, Haliburton, Parry Sound and Algonquin Park have been altered by man-made emissions of sulphates. We believe this alteration has taken place largely over the past few decades — they are certainly not what they were when Mother Nature built them.

"The lakes have a lower alkalinity than when they were formed and because of this the spring pH depression probably occurs more frequently and to a greater degree."

Dr. Brydges explained that some aquatic organisms — such as recently hatched spawn or offspring (known as "fish fry") of sports fish (e.g. trout, bass, and pickerel) — cannot survive the shock of exposure to acid water, or acidic water containing high concentrations of metals which is a side-

spring pH depression most damaging

effect of acid rain. Consequently, in both acid-stressed lakes and fully acidified lakes there is a major disruption, or a complete destruction, of the biological community.

The spring pH depression is the most damaging feature of an acid-stressed lake but the severity varies from year to year according to weather conditions.

"If acid rain continues, all of the readily available neutralizing capacity of the rocks, soils, and sediment may be consumed and the streams and

lakes become acidic all year long. It can take many decades for a lake to become fully acidified, but Ontario wants action taken before irreversible damage occurs," Dr. Brydges said.

When a lake becomes so acidic that the pH is below 5.0 at all times of the year, few fish species or other aquatic life survive.

"While we know that atmospheric pollution is causing our biological systems to go downhill, we have yet to isolate the exact mechanisms in nature.

"On the aquatic side, we're increasingly concerned in our investigations about the evidence of damage to our lakes from heavy metals, such as mercury, cadmium, lead, and zinc.

"Though we have not yet accumulated enough historical background on the terrestrial effects of acid rain in Ontario, as more work is being done there is more evidence that atmospheric pollution is causing vegetation damage. There is increasing concern in Germany, Scandinavia and the

northeastern United States that atmospheric pollution is playing a role in the 'die-back' of forests.

"The world at large is paying a cost for the greatly accelerated deterioration of buildings and structures from the effects of acidic deposition — there has been more corrosion of buildings and statuary in the past 50 years than occurred in the centuries beforehand," Dr. Brydges said.

US scientists agree on reality of problem

In 1980, Canada and the U.S. signed a Memorandum of Intent to confirm both countries' intentions to find remedies for the acid rain problem. In February, 1983, the Canadian and U.S. working groups entrusted under the memorandum to find such remedies submitted their final reports. Environment Ontario scientists were active participants in this activity.

Although the U.S. scientists could not agree in their reports with the Canadian delegation on the establishment of proposed target loading, Dr. Brydges said, they agreed that acid rain was causing a real problem and that a reduction of sulphur deposition would solve it.

He said that Canadian scientists have come forward with a realistic first step toward the abatement of acid rain in North America with the proposal for a target of wet sulphate deposition rates of 20 kilograms per hectare (18 lbs. per acre) per annum.

"While we don't know yet just what the final reduction in deposition must be to protect our aquatic and terrestrial systems from acid rain damage, reducing deposition to 20 kg/ha/yr is a fully defensible first step. We know, for instance, that there is no recorded damage in vulnerable areas receiving sulphur deposition of less than 17 kg/ha/yr, although further studies may show some effects in the most sensitive waters," Dr. Brydges said.

The results of studies in Ontario played a large role in establishing the target loading, setting priority on sul-



Dr. Tom Brydges explains lake acidification to a group of U.S. journalists on the shore of an affected lake near Dorset. (photo: Hans Eljssenck)

phur dioxide control over nitrogen oxide control, defining the spring pH depression as a major water quality problem, and in demonstrating the likely extent of damage to surface waters.

"I firmly believe that as the working groups' three reports, which were released last February, are subjected to more scientific scrutiny, the validity of Canada's proposed target loading will be accepted by the whole North American scientific community, as well as by the public," Dr. Brydges said.

"The good news is that U.S. public awareness and concern about the acid rain problem, and Americans' desire

to solve it, appears much more apparent than it was two years ago. Simply observe all the towns in New Hampshire which have raised a strong protest. Undoubtedly our legal interventions with the Environmental Protection Agency and the tours of U.S. journalists and members of Congress to Ontario to examine the problem are some of the most effective things that have happened.

"Certainly the financial implications to solve the acid rain problem are extremely large — but so are the implications of destroying our environment for future generations. For example, what's going to be left for my children and grandchildren to inherit?"

Acid rain

Research concentrates on three labs



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wide range studies undertaken by the ministry under way. alone-or in co-operation with federal a and its ef- and provincial agencies, research animal life teams from universities, the Ontario nd means to Research Foundation or contractors and consultants.

point of field

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Environment Ontario's Dorset research station lies on the shore of Plastic Lake.

Acid rain

Research conce

Nature ... Pass It On!

FEDERATION OF ONTARIO NATURALISTS

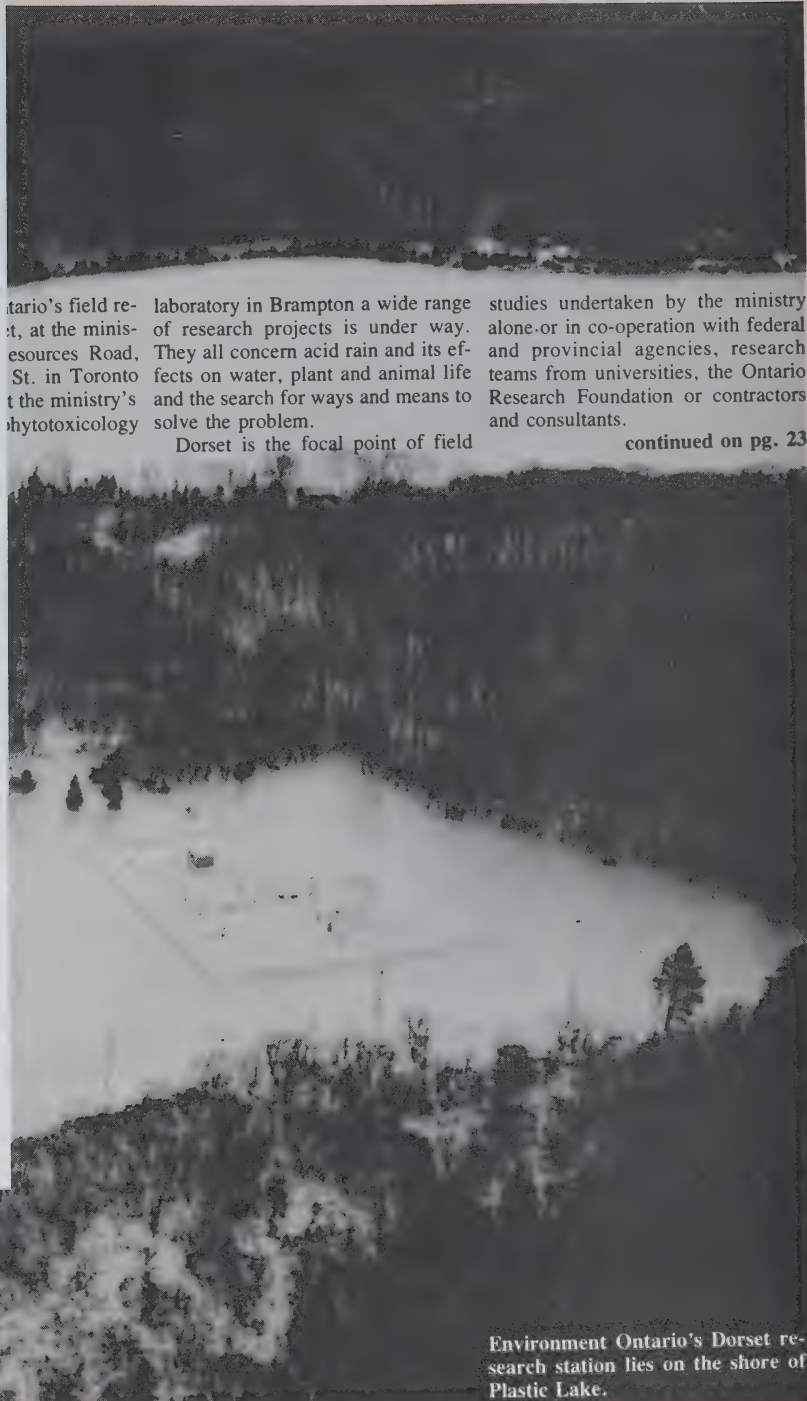
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Environment Ontario's field research station, at the Ministry of Resources Road, St. in Toronto at the ministry's phytotoxicology

laboratory in Brampton a wide range of research projects is under way. They all concern acid rain and its effects on water, plant and animal life and the search for ways and means to solve the problem.

Dorset is the focal point of field

studies undertaken by the ministry alone or in co-operation with federal and provincial agencies, research teams from universities, the Ontario Research Foundation or contractors and consultants.

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Environment Ontario's Dorset research station lies on the shore of Plastic Lake.

Acid rain

Research conce

Nature Pass It On!

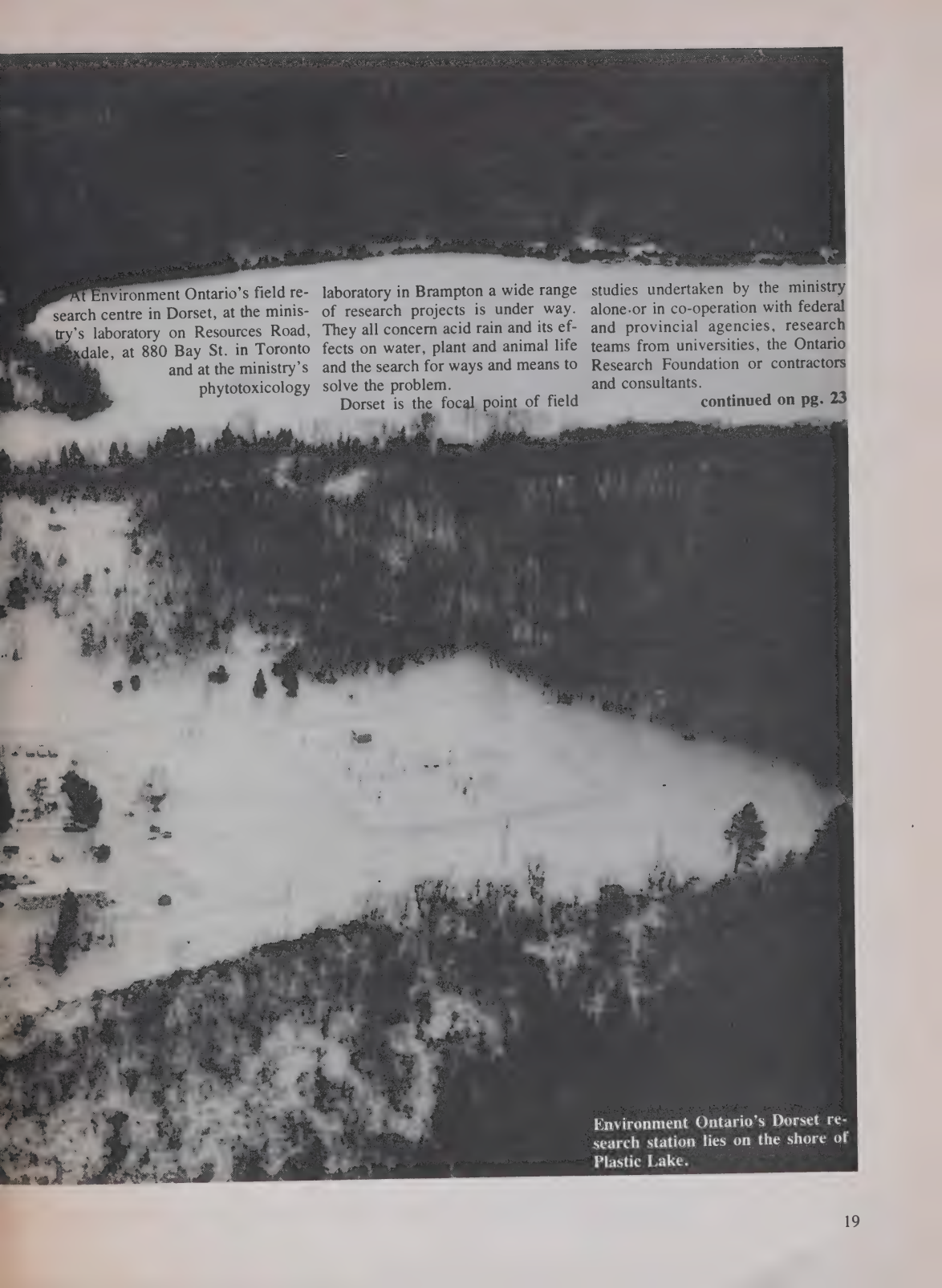
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At Environment Ontario's field research centre in Dorset, at the ministry's laboratory on Resources Road, Exdale, at 880 Bay St. in Toronto and at the ministry's phytotoxicology

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Environment Ontario's Dorset research station lies on the shore of Plastic Lake.



The sequential air sampling tower in Dorset (left) aspires ambient air through a separate filter for every day of the week. Jukka Varto has lowered the towers head (right) to retrieve the filter packs. The packs absorb in separate filtration media sulphates, nitrates, ammonia, gaseous nitric acid and other components of

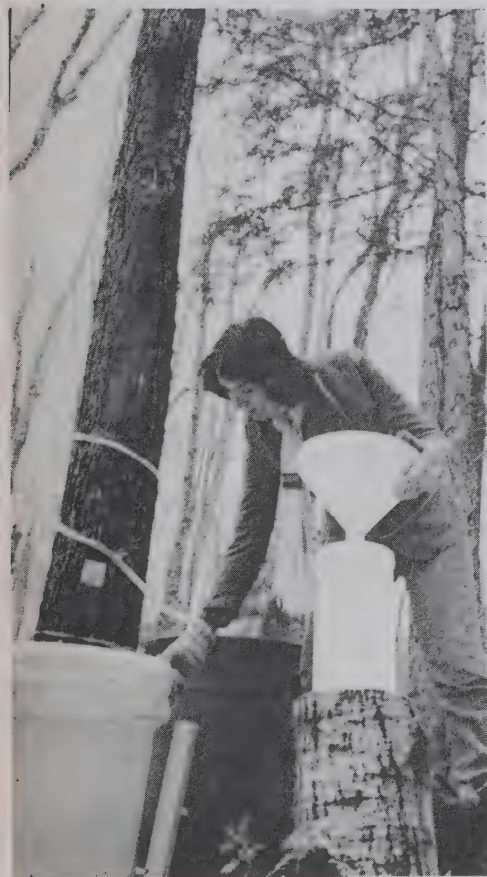


Partial view of endangered Trout Lake, 35 Km north of Parry Sound, one of the lakes selected for the study of neutralisation by liming. The study is being prepared by Booth Aquatic Research Group Incorporated of Toronto.



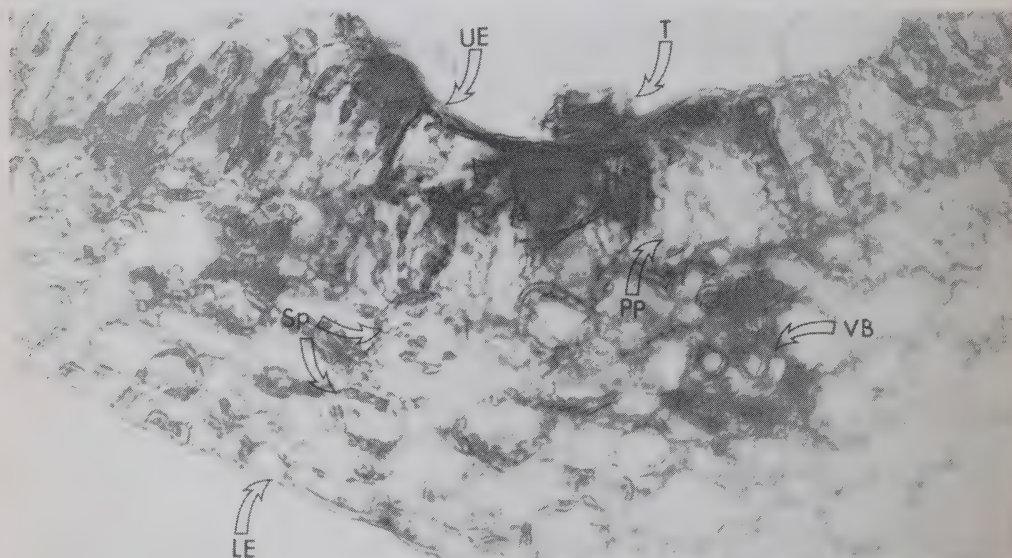
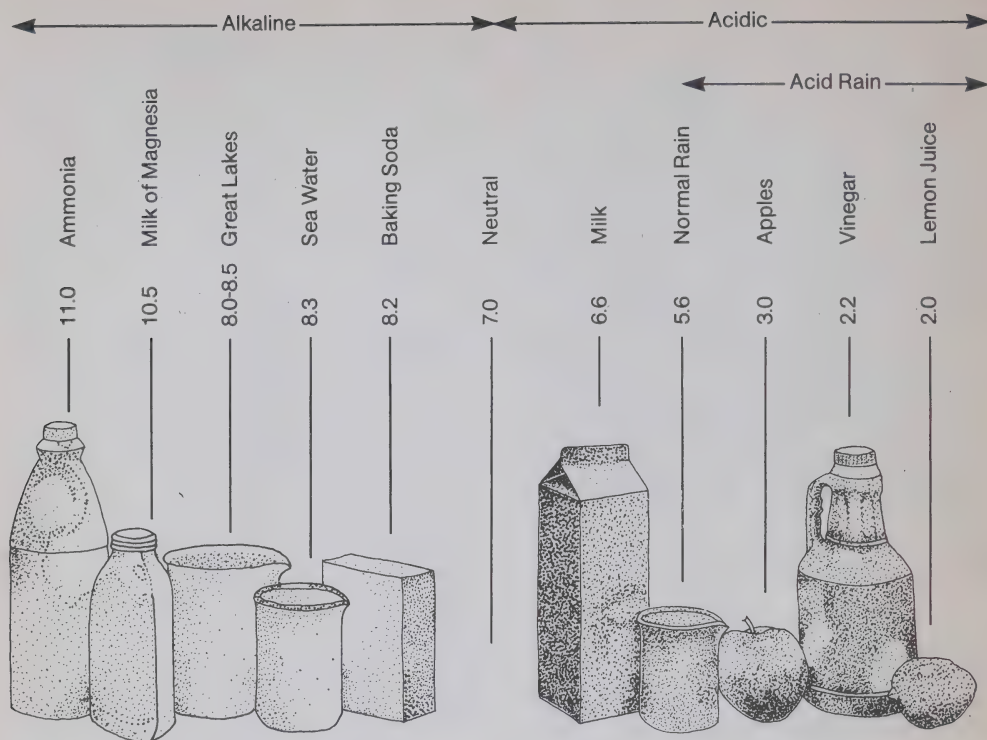
air.

Each filter pack is attached by flexible tubing to a volume meter in a nearby shed which measures the amount of air that has passed through it. The filters are changed once a week and sent to Environment Ontario's main laboratory for analysis. (photo: Tessa Buchan)



(photo: Tessa Buchan)

The effect of vegetation on rain is studied by the Faculty of Forestry of the University of Toronto on contract to Environment Ontario at the Dorset lab. Brenda Wannamaker of the faculty collects precipitation samples after every episode on top of the tower (top left and right) and under individual trees (left). The samples are analyzed in Dorset for pH and ammonia and at Environment Ontario's main laboratory for sulphates, nitrates, cations, phosphates, heavy metals and other parameters.



A cross section of a newly developed lesion in a cucumber leaf, 24 hours after exposure to simulated rain of a pH of 2.5. Several damaged cells can be detected under the microscope: a collapsed epidermal

cell (UE) and degraded cellulose in a palisade parenchyma cell (PP). Spongy parenchyma cells (SP), vascular bundles (VB) and lower epidermal cells (LE) were not affected.

continued from pg. 19

For many of these studies, Dorset provides trailer space, instrumentation and background data. Dorset staff is also engaged in a lively exchange of information among Canadian provinces and the U.S. states. Scandinavian countries and West Germany are also involved.

Intensive studies of acid rain in its various forms and its effects are concentrated on eight lakes situated within 30 km of Dorset. Over 50 lakes are studied in lesser detail.

In a co-operative effort involving the federal Experimental Lake Area Study, five areas in Ontario, Quebec and the Maritimes are investigated.

Some of these studies concern the leaching of metals from rock.

Mercury, cadmium, lead, aluminum, manganese and iron are studied for the hazard they may present to aquatic life.

In this category also belongs the detailed work done by Environment Ontario together with the Ontario



biological responses in 30 watersheds

Ministry of Natural Resources on fish populations.

Other studies deal with chemical effects and biological responses in 30 watersheds, on the measuring of depositions directly from the air or indirectly by run-off and on an effort to express all data collected in numerical form for use in the computer models under development at the Air Resources Branch at 880 Bay St.

The reliable determination of the effect acid rain has on vegetation is an especially arduous task. Plants, from simple lichens to large trees, are subject to a wide range of variable influences.

A plant's well being may depend not only on the quality of soil in which it grows, but also on the quality of the air it breathes and of the water it absorbs. The amount of sunshine it receives, the density and quality of the



Bill Hicks (front) and Trevor Pawson carry buckets of newly hatched fingerlings of rainbow trout, brook trout and lake trout to an exposure tank. After seven days exposure, the effect of low pH and high metal content of the water on the fish can be determined.

(photo: Tessa Buchan)



In the rain application chamber of Environment Ontario's phytotoxicology laboratory, very young

plants are subjected under controlled conditions to simulated rain of varying acidity.

growth around it and fluctuations of climate also count.

Dust is another factor that has, up to now, found little scientific attention. Plants exposed to winds from one direction may get covered by dust that neutralizes acid rain. Those growing along another edge of the same field may receive dust that enhances the effects of acid rain.

Biologists once felt that at the start of a rainfall, raindrops washed acidic water off the leaves and stems.

New studies indicate that acidic particles tend to form the nucleus around which humidity condenses to become rain, and that the acidity of

rain remains constant during rainfall.

Some researchers have found that acid rain kills certain bacteria causing tree diseases, while at the same time possibly harming sound trees.

understanding of terrestrial effects

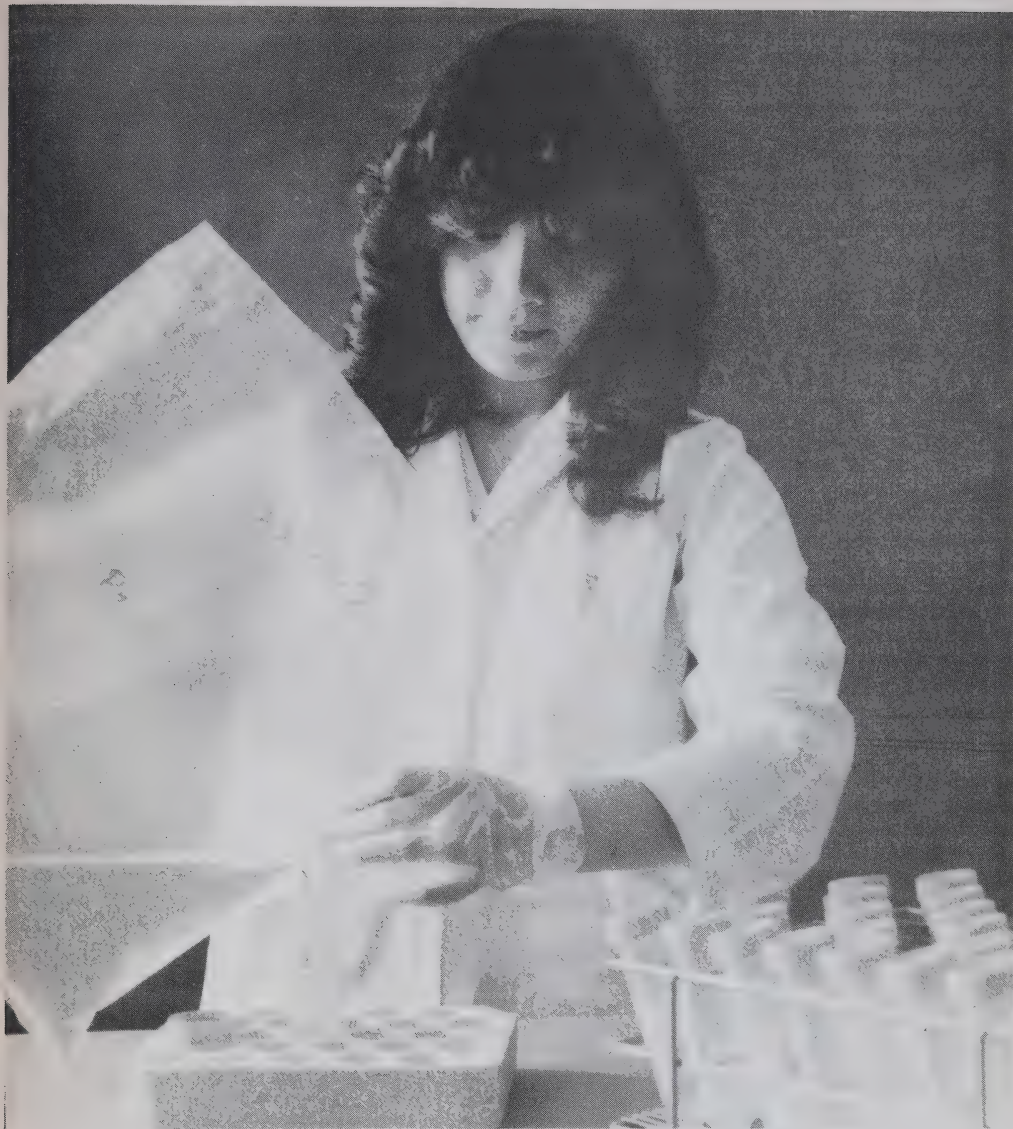
The effects of acid rain on agricultural crops and forests are studied in experiments conducted by the phytotoxicology section of the Air

Resources Branch at the controlled-environment greenhouse and growth chamber facilities in Brampton.

Studies are under way to determine the effects of various degrees of acid rain on the growth and productivity of plants and to identify visible injury induced in different species. The combined effects of acid rain with other contaminants, such as ozone, are also investigated.

Rainfall rates, droplet size, acidity and other properties of rain can be simulated in the chambers.

To find answers to all these questions, and to many others, is the job of the biological research projects. A



Audrey Stewart of the inorganic trace contaminants unit prepares field samples collected near Dorset for analysis at Environment Ontario's main laboratory in Toronto.

(photo: Tessa Buchan)

good part of the Dorset facilities are reserved for this purpose.

In the projects, scientists try to provide a better understanding of the effects of acid rain on terrestrial ecosystems, especially on the movement of nutrients in soil.

In addition, the influence plants may have on acid rain falling through

their foliage and running along their stems and trunks is studied, as well as the movement of elements in the forest floor litter-fall of dead leaves and twigs.

In other investigations, lysimeters to collect soil leachate from various soil horizons are placed near vegeta-

tion throughfall and stemflow collectors. The leachate is analyzed after each rainfall. Soil is analyzed for 30 different chemical parameters.

Representative plants and trees are harvested to determine the extent of nutrient or other element storage in plant tissues — roots, trunks, branches and foliage.

Acid Rain: Is It Threat
To Lives of Humans?

Big Guns Ready
Clean Air Attack



Acid rain brings clouds
of despair to Canada

Acid rain affects U.S.
friendship with Canada

Audubon forces mobilize

Acid Rain: Part I
Canada Bitter at U.S. 'Apathy'

As Lakes Quietly Die, the U.S.
and Canada Feud Over Acid Rain

Acid rain

How our neigh

Since 1980, the U.S. news media have become increasingly interested in the acid rain problem. A good part of this awareness has been generated by Environment Ontario and Environment Canada invitations to U.S. journalists to visit the affected areas.

This new awareness is well reflected in the U.S. journalists' work. Many described their impressions in vivid — and sometimes lyrical — detail.

"Plastic Lake lay in stillness in this central Ontario region of heavy woods as a gentle shower fell from the clouds that had picked up sulphuric pollutants from the smokestacks of the Ohio Valley," wrote Michael T. Kaufman in the New York Times. "Except for the drops bouncing from the surface, nothing moved. There were no fish, no weeds, no crayfish. It was one of the thousands of dead and dying lakes of Canada."

Other reporters were more concerned with the effect of acid rain on people.

"Charlie Cameron, who has fished the waters of the Muskoka-Haliburton lake country in Ontario for more than 20 years, remembers that the pickerel went first. Then the lake trout disappeared and fishermen were soon trading wry jokes about going to the lake to drown worms," wrote Cass Peterson in the Washington Post. "But inside the cottages, and in the government buildings of Toronto and Ottawa, there is plenty of vocal anger and resentment . . ."

Other reporters went to quite a bit of detail in reports, published often as series of articles. Alan Emory wrote in the Watertown Daily Times:

"Marguerite Stimpson of Port Stanfield has found only one or two bees on her apple tree instead of the usual dozen. She blames acid rain."

"Rolf Uhde sees rainbow trout dying on his Milford Bay fish farm within hours after a big rain, and bluish color tints the water."

(Introducing legislation designed to establish a national program for acid rain control, U.S. Senator Daniel Moynihan requested that Emory's reports be entered in the Congressional Record.)

But Mr. Emory and his colleagues did not stop with a description of the acid rain effects. They also published the findings and opinions of Ontario and Canadian experts and authorities.

"Officials here acknowledge that more is at stake . . . than the music of frogs in the cherished Muskoka cottage country," wrote Cass Peterson in the Washington Post. "Research increasingly indicates that harmful effects of acid rain also show up in plant life, and its effects on human health are a growing concern. The growing body of scientific evidence horrifies Canada . . ."

In some cases, Canadian efforts to draw the attention of the U.S. public led U.S. editors to look at their own environment.

"The suspect smokestacks are . . . thousands of miles away, but the stillness is right at our feet . . . This is a gorgeous Adirondack pond. The deep green spruce and the feathery cedar rim it almost completely . . . Along the shore is where the big trout should be jumping. Instead there is only stillness . . ." wrote Bob Tall, outdoor

Acid rain clouds
sunlit green lake

ors see it

editor of the Syracuse Post Standard.

The repeated and as-yet-unresolved discussion of changes to the U.S. Clean Air Act in the U.S. Congress provided U.S. journalists with another opportunity to discuss the acid rain problem.

Russel W. Peterson wrote in the Newport News, Va. Press:

"A gang of modern-day buffalo hunters has been appointed to protect the nation's air, land, water and wildlife The battle centers around the Clean Air Act, up for revision . . . Much acid rain afflicting our lakes can be traced to coal burning power plants that are exempted by the Clean Air Act. Congress must mandate proper controls for these plants. . . ."

But while they are sympathetic to Ontario's acid rain problem, many U.S. journalists also realize that there is no simple solution.

"When Canadian and U.S. scientists . . . look for the villains in the acid rain problem, their eyes fall on . . . dozens of coal-burning power plants that line the coal rich Ohio Valley," wrote Cass Peterson in the Washington Post.

The Ohio Valley has other concerns. "Unemployment levels here are hovering around 14 per cent . . . Industrial plants are reeling under the effects of a nationwide recession"

AEP (the American Electric Power Co., responsible for several large sources of pollutants in Ohio) says that "electricity rate would increase by more than 50 per cent for residen-

tial and by nearly 80 per cent for industrial users," if the acid rain provisions contained in the Clean Air Act rewrite were to be approved.

The United Mine Workers say, that "more than a third of the coal-mining labor force would be affected, and \$6.6 billion in income would be lost every year."

"It is very difficult for a congressman to be courageous when he is confronted with this kind of data," Cass Peterson quotes a Capitol Hill aide.

In Canada, U.S. journalists find, the problem is simpler. ". . . the Canadian approach has been effective in raising public concern south of the border," wrote R.M. Kidder of the Christian Science Monitor. "Although there are numerous bilateral friction points — including Canada's National Energy Program and its Foreign Investment Review Agency, both of which could have serious consequences for American investors, the Canadians have focused intently on acid rain.

"Why such an intense pursuit of the issue?

"Some Americans point out that Canadian politicians who fight acid rain are not likely to lose at the polls. If they bring the U.S. to heel on the issue, they will be heroes — and if they fail, it will be Washington's fault.

"Still others note that, in a nation that otherwise seems divided over everything from energy taxes to French on the backs of cereal boxes, concern over acid rain brings all sides together"

Canada bullhorns US on acid rain
to help save its lakes and forests

Acid rain being investigated
by GM Research Laboratories

NSP denies
area plants
pollute
north lakes

Canadians seek
American help
on acid rain
Air panel: Sulfur crackdown
will endanger coal industry

Rain vs. Cleanup Costs
as a Choice of Poisons

in vs good fishing

g Border War Over Acid Rain

Acid rain threat has
no simple solution

Junction Triangle

Anatomy of a pollution problem

by Robert Koci

It has taken nature millions of years to evolve its efficient handling of waste.

Man is still going through the learning process.

A good example of this process is the case of the Junction Triangle, an area of about 5,500 people and 20 factories in west-end Toronto.

Once there were green hills warmed by the sun. About 100 years ago railways started to criss-cross the land and three lines of steel rails carved a slim triangle out of the landscape.

Around the turn of the century the growing city of Toronto reached the triangle, recalls John Gladski, Toronto city planner concerned with the triangle area from 1976 to 1979. Buildings housing small factories and shops and the workers and their families soon replaced trees and meadows.

signs of vigorous industrial activity

By today's standards these industrial operations were modest. Industry liked the proximity of the railways as a link to their suppliers and customers. The workers and their families liked the short walking distance to the job at a time when the automobile was just a gleam in some inventor's eye.

There must have been pollutant emissions and spills from the factories — but up to about the middle of this century, dark clouds from chimneys, noises from factories, and foul liquids disappearing into sewers and streams were all seen as signs of vigorous industrial activity and prosperity.

Then things started to change.

Several factors caused this change.

The old craft shops had grown through two world wars to industrial operations. The smokes and smells that the old shops emitted were familiar to people living in the vicinity. They had grown used to them, and they considered the nuisance a small price to pay for the good incomes they earned.

As shops grew to industrial operations, the materials they used also changed. They produced more and better products, but in doing so they used more exotic synthetic and potent chemicals that had strange properties and — when spilled or improperly handled — emitted strong and strange odors. At about the same time, the people who had settled in the area started to learn that some of the new materials also had sinister, mysterious and little-understood qualities, Mr. Gladski said.

People also started to realize that material emitted into the air or dumped into sewers and waterways does not simply disappear. It kept appearing after some time in the strangest of places — in the eggs of eagles, for example, or in the flesh of fish. The suspicion arose that not only wild animals, but humans, too, may suffer from the indiscriminate disposal of wastes.

Another factor was the mobility city dwellers gained around the middle of this century. In due time only a few of the people living in the Triangle area, bordered by Bloor, Dundas and Dufferin Streets, were also working in the factories abutting their properties.

Some time in the Sixties, people started to complain. At first to themselves, then to the authorities.

Authorities — municipal governments — at first reacted slowly and ineffectively. The first zoning bylaw

in Toronto was passed in 1954, but all it could do was to prevent the indiscriminate mixture of industrial and residential areas in the future. It did not change existing situations, Mr. Gladski said.

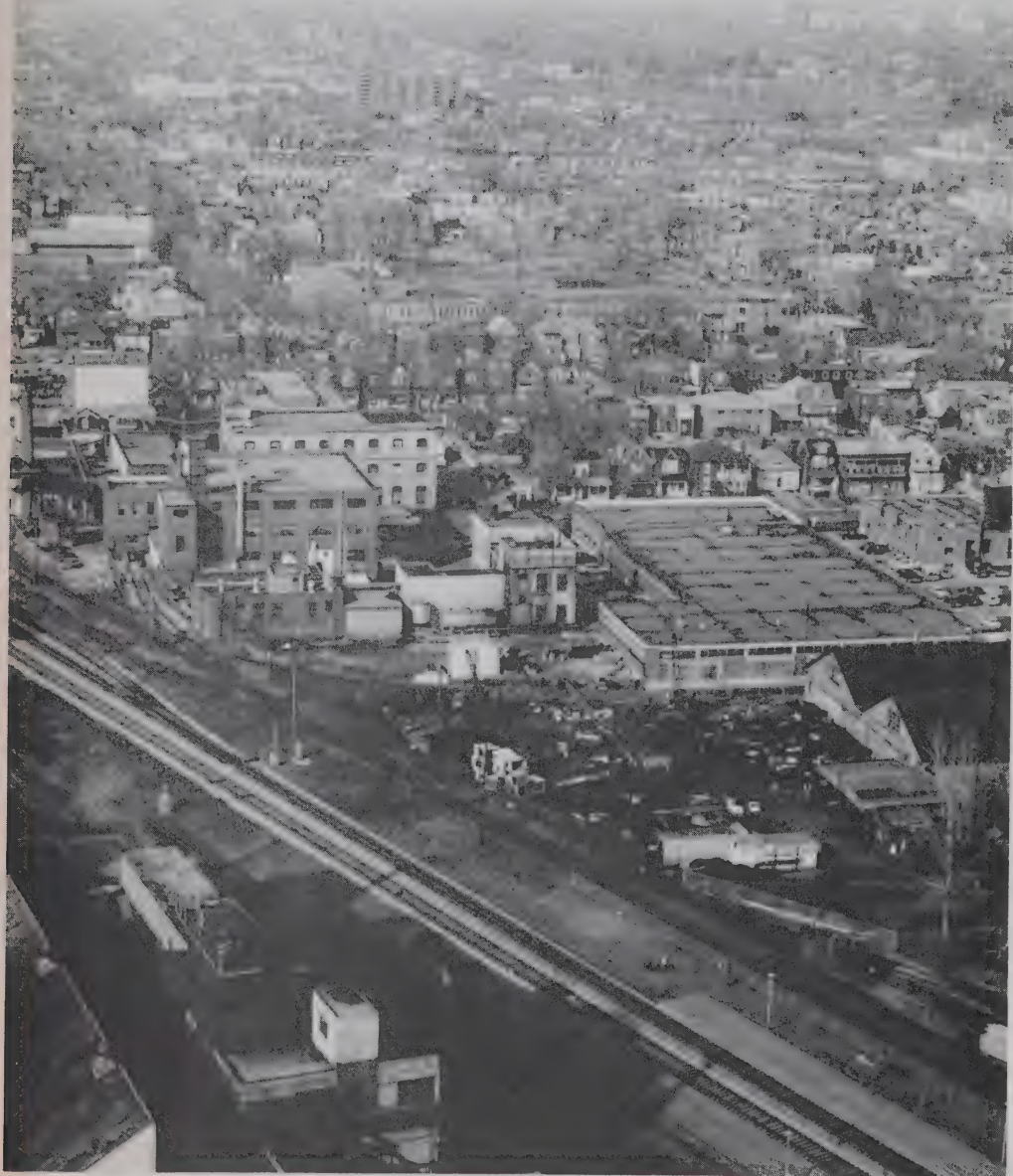
Air pollution became a municipal concern in the late Sixties. City inspectors used simple grey scales to measure the darkness of smoke issuing from factory stacks — and were reluctant to prosecute the best taxpayers and providers of jobs in the community.

enforcement slowed by lack of tools

Things started to improve when the control of air pollution was handed over to provincial authorities in the late Sixties. It was eventually concentrated, together with the control of other forms of environmental damage caused by the disposal of all kinds of waste, in the hands of provincial authorities — first the Department of Health, later the Department and, in 1972, the Ministry of the Environment.

At first, things moved slowly. The laws were there, but enforcement was hampered by the lack of analytical tools needed to determine the presence of dangerous materials and their sources.

When these tools became available, equipment that could successfully control emissions had to be developed. By the mid Seventies most of the factories which used a wide assortment of chemicals to produce paints, inks, glues, adhesives and rubber



In the Junction Triangle area industry and dwellings stand in close proximity. (photo: R. Koci)

ministry develops alert system

goods that were recognized as a source of pollution in the Triangle area had filters and baghouses installed to clean up the smoke issuing from their chimneys.

But strange smells persisted. They came from open storage tanks, improperly stored empty barrels, from the buildings in which ingredients were boiled, mixed and treated.

The following years saw some dramatic developments, recalls Barney Singh, acting manager of the industrial abatement section of Environment Ontario's Central Region.

- The Ministry of the Environment, which had assumed responsibility for maintaining and improving the quality of the environment in the province, received better tools and knowledge in the determination of pollutants, their sources and possible means of abatement.
- Most of the companies involved installed better control equipment as it became available and improved the control of their emissions.
- Citizens became better organized and more sensitive to the quality of their environment. Their voices and their calls for further improvements became louder.
- The City of Toronto established a task force to deal with the problems and public meetings were held.

These developments started to complement each other. The authorities acquired costly and sensitive instruments and learned to measure minute quantities of pollutants, Mr. Singh said.

Newly emerging environmental engineers were hired by companies to often find simple and ingenious ways to solve emission problems.

The public gained more information, although this may not have always contributed to a better understanding of the problems. In many cases it gave rise to apprehension and fears, which were magnified when a major spill occurred in April, 1982. The accident

created the suspicion of other, not as readily detected spills and gave rise to doubts about the quality of air in the area.

To deal with these problems, the city established a task force, and public meetings were held to discuss the situation and help to find solutions.

The ministry placed the Junction Triangle on a special alert system that guaranteed the prompt arrival of a qualified inspector at the scene upon receipt of a complaint — any complaint, even one dealing with locally spilled gasoline or with the smell of a neighbor's freshly painted roof.

getting people involved

Studies of abatement methods were intensified. The progress that had been made became evident at a recent public meeting held by Environment Ontario on the Junction abatement program.

The meeting was attended by knowledgeable representatives of the companies involved, of the Ministry of the Environment, the City or Toronto task force, of the organizations of the citizen. In attendance also were Toronto and Metro Toronto experts and alderman, the local MPP, and numerous citizens.

Presiding over the meeting were Toronto Alderman William Boytchuk and George Mierzynski, director of Environment Ontario's Central Region. The purpose of the meeting was to give citizens living in the area an opportunity to get involved, to present their ideas, to approve or disapprove the accomplished and proposed changes. Basically, the measures dealt with the control of odors and spills.

Barnie Singh, manager of the industrial abatement section and Don Bartkiw, senior district officer at Environment Ontario's Central Region gave a detailed description

of the abatement programs undertaken by the companies with ministry approval.

The six companies involved had, according to these reports, spent the nine months since the last large spill in April, 1982, well. They had developed spill contingency procedures and had trained personnel to deal with emergencies.

They had built dams to prevent accidentally spilled materials from entering the sewage system. They had eliminated or were planning to eliminate product lines and had improved loading and storage areas.

They had installed or designed systems that would prevent the escape of gases and fumes regardless of their toxicity. They had improved material and product handling, installed alarm systems, drains and seals, built stacks to disperse odors, provided surge tanks.

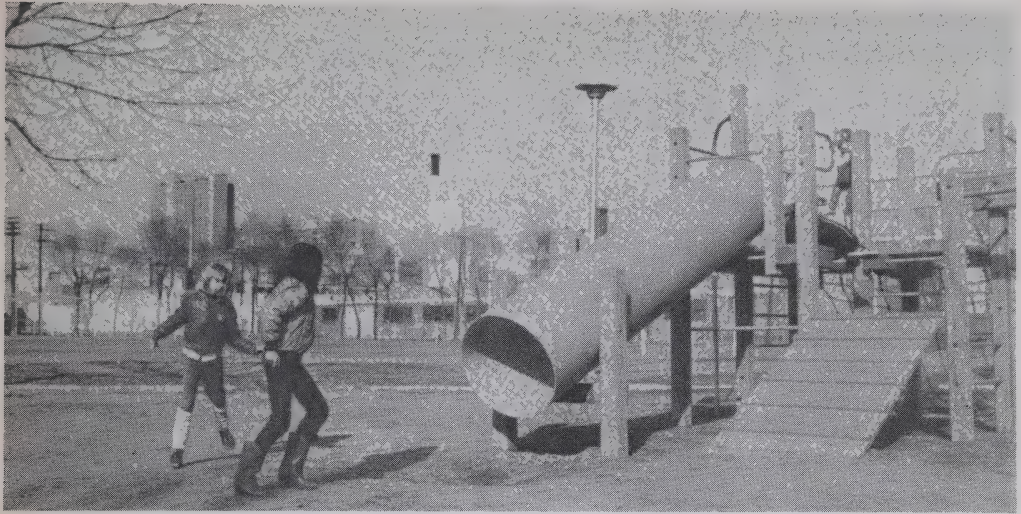
And they were willing and able to answer any question the public could throw at them.

Many of the questions coming from the floor revealed the knowledge citizens had gained in recent years. They dealt with the quality and quantity of raw materials used by the manufacturers. Someone asked whether the higher stacks would not just move pollutants elsewhere, as is happening with emissions that end up causing acid rain.

Ministry experts explained that dispersion is a valid method in the control of gases. Automobile exhaust gases in a closed garage can kill, while the dispersion of the same gases in the open has no drastic consequences, even in traffic jams.

Some citizens showed skepticism. They asked why it has taken so long to provide controls, and what the difference was between an abatement program approval and a control order. They asked why the companies were not forced to move out of the area while guaranteeing the jobs of their employees.

There were questions about the reputations of the companies, and complaints. They got an explanation of the existing 24-hour alarm system, of the monitoring equipment installed in the area, and of the fact that it simply takes time to reach an inspector



In the Junction Triangle residences, schools and industry plants live very closely together. Since 1954,

Toronto zoning by-laws would not permit such "togetherness".

(photo: Tessa Buchan)

and to have him drive through the city streets to the Junction Triangle.

Some voices from the public sounded hostile. They accused everybody involved of neglecting visual pollution, of little or late response to calls. They suggested that companies be hidden behind walls. They spoke of their difficulties in renting or selling their houses.

A few voices were complimentary. Jim Ryck, former publisher of a local newspaper that started the pollution story rolling in the early sixties, appreciated that there has been a lot done. The clean-up has started. The area has changed a lot since the old times.

Michael Homsy, the president of the Citizens Watchdog Committee, acknowledged that during the last year Ministry of the Environment people have "behaved nobly". They answered all complaints within 20 minutes to half an hour. He declared his willingness to continue his close co-operation, along with his committee, for the betterment of everybody — industry and citizen.

While the half-dozen public meetings held in the Triangle area are always lively affairs, discussions between company and ministry experts on abatement measures are very much

down to earth. Engineers are talking to engineers in the same language.

At one meeting in the Triangle area, ministry experts proposed the company build two stacks to vent vapors. Company engineers found that placing the guy wires needed to support the stacks would be difficult in the densely built-up yard. They suggested the construction of a single stack at a different location, from where it could serve both areas.

In addition, regulations demand stack height to be double that of the nearest building. If that building is scheduled for demolition, could the stack height be reduced?

no equipment off the shelf

Underground storage tanks that are hard to inspect should be replaced by above-ground tanks, ministry experts proposed. The company agreed, but feared that construction activity could give the impression that the company's facilities were being expanded in violation of a local by-law. Could the tanks be moved to an existing empty building?

The ministry's proposed ventilation system of a working area would call

for the installation of a new expensive heating and air-conditioning system. Could direct exhaust of the tanks be accepted, instead?

Engineers considered, calculated, worked, and arrived at practical and effective solutions.

The establishment of a timetable posed another set of difficulties. Equipment needed for control is rarely of the off-the-shelf type. It has to be designed and engineered. Tenders must be called, time allotted for bid calculation, equipment, manufacture and construction.

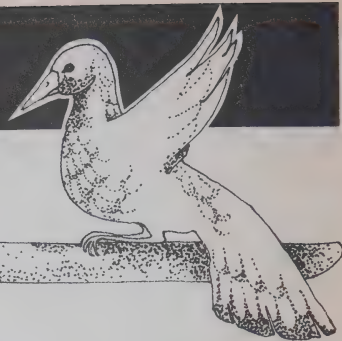
Some of the systems proposed call for building permits, some pose legal questions.

The schedules were revised and recalculated. A 1983 date seemed possible and was agreed upon, provided fall and winter storms and city planning approvals did not interfere with the erection of the stack.

The papers will be duly approved and signed, and the work will start as soon as possible.

It will be another step in the clean-up of the Triangle — a step that will not be very visible to outsiders and that will not improve the general air quality for Torontonians, but a step that will be beneficial to the Triangle neighborhood.

It's all one world...



Third World needs good pumps

Four-fifths of diseases in the Third World are linked to dirty water or lack of sanitation, says the New Scientist in a report on the International Drinking Water Supply and Sanitation Decade of the 80s.

Among them are river blindness, schistosomiasis, malaria and diarrhea, which alone kills about 20,000 children every day.

Three out of five people in the Third World have no easy access to clean water. In rural areas this figure drops to one in three. Women and children often spend most of their day collecting water. In hilly areas of Kenya, women spend nine-tenths of their time on this task.

The problem can be solved for many by making underground water resources more easily accessible by hand-pumps. UNICEF and the World Bank are both striving to find a design for a hand-pump that is cheap and easy to maintain.

Improvements in sanitation will be harder to achieve. Only one in four people in the Third World has access to any kind of sanitation. In some areas, ignorance and taboos make it

difficult to introduce new customs.

Engineers are slowly acknowledging that Western-type sewage treatment cannot be adapted for use in many parts of the Third World.

To achieve a marked improvement by the end of the decade, every day half a million people would have to be provided with better sanitation. The costs for such a project are estimated at \$300 to \$600 billion over ten years. Currently about \$6 to \$7 billion are spent yearly.

Recyclers learn the hard way

Moaning of gloom and doom contributes absolutely nothing to the future of the scrap metal industry, James Anderson, president of the Institute of Scrap Iron and Steel, told the institute's membership. But the disaster year of 1982 told the world's largest recycling industry that it should not operate as it has done in the past. By operating as if it were 1982, the industry could discover what productivity can mean.

The two most pressing needs of the industry are reliable industry data and technical education, Mr. Anderson said.

To improve technical education, the institute plans to establish a recycling advisory committee with a mandate to develop textbooks, manuals, courses and seminars for the industry.

Our neighbors get cleaner

The U.S. environment is cleaner today than it was 10 years ago, states the U.S. General Accounting Office in a recent report. Between 1979 and 1988, \$735 billion will be spent to curb pollution.

The areas calling for a great increase in clean-up efforts are solid waste disposal and water quality. In 1982, 14,000 of 20,000 municipal waste sites did not yet meet established standards.

The world's oceans are fine, but...

The open seas are in fine shape, but warning signals about environmental threats to the marine environment can be recognized in coastal areas most intensively used by humans, says the United Nations Environment Program (UNEP) in its report, *Health of the Oceans*.

Harmful effects on the marine environment can be detected especially in semi-enclosed seas such as the Gulf of Mexico, the Mediterranean, the North Sea and the Baltic Sea.

The input of sewage into coastal zones is increasing, but if it is adequately controlled the fertilizing nature of the sewage may be regarded as more significant than its potential toxicity.

Deep-sea life usually recovers within a short time from effects of oil spills. Tidal communities, especially birds, may suffer from oil spill damages for a much longer period, sometimes for years. But there is no evidence that oil alone can threaten the survival of species, the report says.

The authors have failed to find confirmed reports of human illness having been caused by the consumption of marine organisms that contained



PCBs, although PCB concentrations in some marine organisms exceed levels set by national authorities.

Heavy metal concentrations recorded in shellfish and fish do not suggest any threat to the average human consumer and rarely damage the ecosystem.

Largest estuary deteriorates

Chesapeake Bay, the largest estuary of the United States, is slowly deteriorating from pollutants, reports the U.S. Environmental Protection Agency. Many aquatic grasses have disappeared, canvasback, redhead and goldeneye ducks have decreased in number.

The decline is caused by the seepage of DDT, fertilizers, sediments, heavy metals and other toxic materials to the bay.

EEC monitors waste

Each year about three million tonnes of toxic waste are transported for treatment across the borders of

member states of the European Economic Community.

Of the ten states, only West Germany has a waybill system that obliges international and regional shippers to obtain prior permission from the receiver of the wastes. A few other countries have bilateral agreements with their neighbors.

Under a new directive, expected to become law by the end of this year, shippers of toxic wastes will be obliged to notify the governments of the countries of origin, transit and destination of the shipment. They will also have to produce confirmation that a suitable disposal facility will accept the shipment.

The new techniques used by some countries for the incineration of chemical wastes and the burial of contaminated wastes at sea under a cap of clean sediment should be kept under review, the report recommends.

There is also a strong case for the monitoring of selected substances in the oceans with a focus on toxic substances that are produced and used commercially. The monitoring aims at the securing of data that would enable scientists to predict environmental impact.

The report was written by leading marine scientists forming the Joint Group of Experts on the Scientific Aspects of Marine Pollution. It reflects the scientists' research done during the past four years and will be updated in another four years.

London sewers are falling down

When Britain's sewage systems were built during the Victorian times, they were built to last, but lasting doesn't mean forever, reports Fred Pearce and Mick Hamer in *New Scientist* magazine.

After about one hundred years of continuous use and overload, they have not only come of age, they have fallen into an old, decrepid one.

The Greater London Council found that both water and sewage mains need replacement and the cost of these repairs will run into the billions of dollars over the next ten years.

London, however, is not the only area that finds itself in this situation. Time has played havoc with the sewage and water supply systems in all of Britain's major cities.

The House of Lords Select Committee on Science and Technology, says Britain's water systems could decay beyond the control of the authorities because too little attention has been paid to the upkeep of these mains.

For the past decade, a major roadway has been closed to traffic due to holes in the road surface because of the main's abominable condition.

The Water Research Centre says that although Manchester is the best known area for crumbling sewers, there are five thousand collapses and blockages each year throughout England and Wales.

There are rumours in Manchester that tell of holes so large that double decker buses can fall in. A hole of that size can be the result of a damaged sewer pipe of only 250mm diameter.

Since the Corporation of Manchester was among the first to build these giant brick structures during the initial period of the industrial revolution, it should be expected that they are going to be the first ones that will demand rehabilitation. All of this is in light of the fact that the systems are continually overloaded because of increased usage.

These brick structures are decaying rapidly in the northern industrialized areas. The smaller communities are not untouched by this public catas-

trophe. Tholthorpe Village, just north of York, filed a report with the Yorkshire Water Authority last summer that clearly described the disastrous state of its sewage system. It tells of the village sewers that drain directly into the Derrings Beck River by two outfalls. The flow from one outfall is completely untreated, while flow from the other is treated by a small overloaded septic tank. The water is also polluted by the effluents from the village abattoir. Frequent blockages and collapses result in sewage flow along the roads of Tholthorpe.

The deterioration of the sewers is attributed to hydraulic overloading and age. The results of the collapse of a small sewer are amazing. An overloaded, damaged main will spill into the surrounding ground. When the pressure falls, the silty water reenters the sewer and clogs and weakens it, thereby creating a void that becomes a hole, large enough to swallow a double decker bus.

But despite all this information, the Thames water authorities have cut down on spending on sewer renewal.

A newly developed plastic lining can expand the life-span of the present system at half the price of rebuilding them. According to Donald Dees from the South West Water Authority, the cost of plastic lining is low, but nobody knows how long it may last, and the solution may not be economical in the long run.

The water authorities not only have to contend with decaying sewers but also with decaying water mains where estimates say as much as half of all water is lost.

During the 1960's and 1970's the water engineers built reservoir after reservoir to meet water demands, but didn't realize that between 26% and 50% of the water was escaping to the surrounding area and not reaching the users. Today, there are too many reservoirs because of the depressed industrial market.

The mains face corrosion from soft acid rain water flowing off the peaty hills that supply most of Britain's water. As a result of the corrosion, the

water is discoloured and has seen an increase in the level of metal contamination.

A \$330 million program put into effect by the Yorkshire Water Authorities, is trying to correct these problems.

The water authorities know that because little or no money has been invested in renovations and renewals, more than two-thirds of Yorkshire's water mains need replacing.

The water authorities don't want to upset their customers by raising prices, yet they can't repair or replace the mains without money. They are faced with a "damned if you do and damned if you don't" situation.

Waste dump cleaned

More than 60,000 barrels of toxic wastes will be removed and the leaking of wastes to groundwater will be stemmed at a cost of 30 million from an abandoned hazardous waste site near Seymour, Indiana. Twenty-four companies, including IBM, GM and Du Pont, will contribute \$7.7 million to the clean-up project.

Ban leaves lead in piping

Britain's move to ban lead in gasoline may remove only one source of the contaminating metal, reports *New Scientist*. About 45 per cent of Britain's households still use water that has passed somewhere on its way to the consumer through lead pipes.

The Royal Commission on Environmental Pollution estimates that some people are taking about 300 micrograms of lead a day from their drinking water, against a recommended level of 50 micrograms per litre in tap water.

At the same time three new studies presented to a meeting of the British Psychological Society suggest that the link between slightly raised lead levels and impaired intelligence is rendered insignificant by other social factors.



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of the
Environment

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